NCPDI Documentation

Description

The National Coastal Pollutant Discharge Inventory (NCPDI) is a national data base and computational framework that provides estimates of pollutant discharges from all point, nonpoint, and riverine sources into the estuarine coastal and oceanic waters of the contiguous United States. It approximates pollutant discharge conditions during the period from about 1982-1991. The NCPDI point source and upstream source components are circa 1991 and were developed by professional staff at NOAA. Non-point urban and non-urban source components were developed through extramural contracts. The Gulf of Mexico component was developed by Resources for the Future (RFF), Washington D.C. (Circa 1987); The East and West Coast components were developed by the firm of Dalton, Dalton, Newport, Inc., Cleveland, Ohio (circa 1982 and 1984 respectively). Existing information on each source has been compiled, evaluated, and incorporated into a computational framework for estimating pollutant discharges. Major categories of pollutants included are: 1) oxygen-demanding materials; 2) particular matter; 3) nutrients; 4) heavy metals; 5) petroleum hydrocarbons; 6) pathogens; and 7) wastewater. Point sources include those facilities that discharge pollutants to surface waters through a pipe, ditch, canal, or related type of conveyance on a regular basis, and have a National Pollutant Discharge Elimination System (NPDES) permit issued either by the EPA or a designated State agency. Nonpoint sources include discharges from urban nonpoint sources, non-urban nonpoint sources such as runoff from farmland (cropland and pasture/range) and forestland, and upstream sources discharging to coastal areas.

The NCPDI is designed to be used as a screening mechanism for assessing the relative contributions of various sources to pollutant discharges throughout the nation's coastal zone, both under existing conditions and for a range of alternative policies that affect the amount and distribution of these discharges. The NCPDI is that intended to bridge the gap between the mountains of very detailed data available for some areas and to sparse data available for the rest of the nation's coastal zone.

The data presented are aggregated data consisting of 4 ASCII files as described below.

The ASCII tab delimited files are:

By HUC:	hucncpdi.txt
By WATERSHED:	wshncpdi.txt
By COUNTY:	fipncpdi.txt
By STATE	stncpdi.txt

Supporting Files:

Us_f7.txt:	Point Source Pollutant Loading Estimates by Facility
Cdbest91.txt:	Upstream Source Pollutant Loading Estimates at Point of Entry to the EDAs.

Variable and Code Descriptions

Refer to Excel table "ncpdi_fields.xls" (Column Descriptions and Specifications) for description of all field elements in each of the files listed above. Refer to Excel table "ncpdi_codes.xls" (Code Field Definitions) for description of codes in table of field elements.

Source(s) of Information

NCPDI Urban and Non-Urban Nonpoint Source East Coast Data 1982
NCPDI Urban and Non-Urban Nonpoint Source West Coast Data 1984
NCPDI Urban and Non-Urban Nonpoint Source Gulf of Mexico Coast Data 1987
NCPDI National Point Source Data 1991
NCPDI National Upstream Source Data 1991

National Coastal Assessment
Special Projects Office
NOS, NOAA
1305 East West Highway, SSMC4 9th Floor
Silver Spring, Maryland 20910
Telephone: (310) 713-3000
Fax: (301) 713-4384

Abstract

The point source data are referred as 1991 data because estimates of pollutant loading were obtained for each active pipe discharging pollutants to surface waters by making use of primarily EPA's Permit Compliance System (PCS) 1991 data base. When possible, pollutant discharge estimates have been derived from monitoring sources. However, the amount of monitoring data varied by pollutant parameters such as flow, total suspended solids (TSS), and biochemical oxygen demand (BOD5), with far less monitoring data available for heavy metals, nutrients, and oil and grease. When monitoring data were not available or appeared to be inaccurate, estimates were made based on NPDES permit limit requirements when available. If no monitoring, permit, or other data were available or acceptable, estimates were made based on typical pollutant concentrations (TPC) considered typical for the facility's industrial or municipal activity. For more information on point sources, refer to "Point Source Methods Document: December 1993, PSC Branch, SEA Division, ORCA, NOS, NOAA" report.

The urban and non-urban nonpoint source data are referred as 1982-1987 data because estimates of pollutant loading were obtained in 1982 for East Coast, 1984 for West Coast and 1987 for Gulf of Mexico region. For the non-urban nonpoint loading estimates, the SWRRB model developed by Jimmy Williams and Arlin Nicks of the U.S. Department of Agriculture Agricultural Research Service (USDA-ARS) was used to estimate sediment and water yields from rural basins. This model operated on a one-day time step and captured short-term variability in parameters important to sediment yield such as soil moisture. The model accounted for the processes such as single-event, rainfall characteristics, surface runoff volume, and peak runoff flow rates. It used input data, which were readily available from sources such as the NRI, LUDA, and the National Climatic Data Center (NCDC). The geographic unit for which pollutant loading from the non-urban, nonpoint sources was computed is the HUCO (i.e. the land area which is the overlap of a single county and USGS cataloging Unit. Pollutant loading estimates aggregated by County were then areally prorated to the 1999 Coastal Assessment Framework (CAF) to obtain watershed based nonpoint source pollutant loading estimates. For more information on the non-urban nonpoint source data, refers to "The NCPDI Non-urban Runoff Methods Document, April 1987, Strategic Assessment Branch, Ocean Assessment Division, ORCA, NOS, NOAA". For the urban-nonpoint runoff estimates, the methodology relied heavily on few major data sources. The 1980 Census of Population for definitions of urban areas, estimates of total county and city urban land area and population data and the 1982 Needs Survey which furnished virtually all the information on the characteristics of urban stormwater systems in the study area. Precipitation data were taken from weather station records (NCDC) and LUDA was used to develop information on urban land use activities. The end results of the urban storm methodology are estimates of urban runoff, volumes and associated pollutant loadings. Calculations were made by city and by HUCO. As for the non-urban nonpoint source loading estimates, county aggregated data was areally prorated to the 1999 CAF. For more information on the urban-nonpoint source data refer to "The NCPDI Urban Runoff Methods Document, April 1987, Strategic Assessment Branch, Ocean Assessment Division, ORCA, NOS, NOAA".

The Upstream Source data are referred as 1991 data because estimates of pollutant loading were obtained using USGS Gauge Station 1991 daily flows. Upstream sources are rivers or streams that originate outside of an Estuarine Drainage Area (EDA). These bodies of water enter an estuary and contribute to the total pollutant load eventually discharged to the ocean. Upstream sources carry pollutants from both urban and non-urban areas. The major pollutants from these sources include: suspended sediments, pesticides, nutrients (nitrogen and phosphorus), chlorinated hydrocarbons (Polychlorinated biphenyl), heavy metals (arsenic, cadmium, copper, chromium, iron, lead, mercury, silver, zinc), petroleum hydrocarbons (oil and grease), and fecal coliform bacteria.

Pollutant loads at the NASQAN stations were estimated using the Load Estimation (LOADEST) regression model* created by the United States Geological Survey (USGS). These estimates then, were areally prorated to the upstream source point of entry to the EDA. LOADEST makes use of two input databases. The first provides a historical record (1974 - present) of pollutant concentrations for ten metals, nutrients, and sediment. The second incorporates measured daily flow for 1991 (base year). LOADEST applies both databases to the following general loading equation to produce statistics and pollutant discharge estimates:

$$\ln L = B0 + (B1 * \ln Q) + (B2 * \ln Q2) + (B3 * \sin 2p\ T) + (B4 * \cos 2p\ T) + (B5 * T),$$

Where

L = Pollutant Load (mass/time)

Q = Stream Flow (volume/time)

C = Pollutant Concentration (mass/volume)

T = Time (Julian Days)

B1 - B5 = Regression Coefficients.

For a more detailed description of the load estimation regression model, please refer to:
"ESTIMATING MEAN CONSTITUENT LOADS IN RIVERS BY THE RATING-CURVE AND FLOW-DURATION, RATING-CURVE METHODS, Charles G. Crawford, PhD Thesis, School of Public and Environmental Affairs, Indiana University, December 1996".

Data Processing

Following the quality control of geographic information, point sources were assigned watershed attributes from NOAA's Coastal Assessment Framework by way of a spatial overlay operation in MapInfo. Point Source facility level data were aggregated to all four different spatial units. To prorate the county-based nonpoint source estimates to NOAA's Coastal Assessment Framework (CAF), a set of simple areal proration coefficients was developed. To geo-reference the land use data to NOAA's Coastal Assessment Framework (CAF), the land-only CAF GIS map was intersected with the County land-only shape file to obtain a shape file called "County_Unique". This County_Unique map was then intersected with the land use map (LULC + 1990 Population Upgrade) to obtain intersected areas of land uses in each unique/county (unco) polygon. The land use map from Texas A&M was previosly improved by correcting a quad in the Pacific area that had missed glaciers from the original LULC map. A report from ARCVIEW (Nipa Parikh's script) was obtained. The percentage of land in this area (unco) with respect to the county land was computed to areally prorate the county level NCPDI nonpoint source data to CAF's spatial units. All the data aggregations were done using the SAS software. The upstream source loads were aggregated by both watershed and county to obtain estimates of pollutants entering coastal areas.

The total values in the watershed file were calculated as follows:

t_flow = sum(p_flopro,n_urbflo,n_crpflo,n_prflo,n_forflo,u_floann);
t_tss = sum(p_tssann,n_urbtss,n_crptss,n_prtss,n_fortss,u_tssann);
t_tn = sum(p_nann,n_urbtn,n_crptn,n_prtn,n_fortn,u_tnann);
t_tp = sum(p_pann,n_urbtp,n_crptp,n_prtp,n_fortp,u_tpann);
t_as = sum(p_asann,n_urbas,n_crpas,n_pras,n_foras,u_asann);
t_cd = sum(p_cdann,n_urbcd,n_crpcd,n_prcd,n_forcd,u_cdann);
t_cr = sum(p_crann,n_urbcr,n_crpcr,n_prcr,n_forcr,u_crann);
t_cu = sum(p_cuann,n_urbcu,n_crpcu,n_prcu,n_forcu,u_cuann);
t_fe = sum(p_feann,n_urbfe,n_crpfe,n_prfe,n_forfe,u_feann);
t_hg = sum(p_hgann,n_urbhg,n_crphg,n_prhg,n_forhg,u_hgann);
t_pb = sum(p_pbann,n_urbpb,n_crppb,n_prpb,n_forpb,u_pbann);
t_zn = sum(p_znann,n_urbzn,n_crpzn,n_przn,n_forzn,u_znann);

Note: refer to “data dictionary” for description of variables above

Quality Control

The inventory provides source and basis codes for each pollutant estimate assisting the user to independently evaluate the relative accuracy of the estimates. Overall, the accuracy of the data in the inventory could be rated as good based on the individual data sources used, and the extensive computerized and manual quality control checks. Point source location information was verified by comparing facility FIPS (county) codes against a 1:250K scale FIPS boundary file in MapInfo (Geographic Information System program). Existing point source location information was accepted for all facilities that plotted within five miles of the correct county. Facility coordinates for points greater than five miles away from the correct county were updated with city centroid or county centroid data. The proximity analysis generated a subset of 232 facilities that exceeded the five mile limit and were subsequently reassigned using either city or county centroid depending on data availability.

Table Specifications

hucncpdi.txt	426,625 bytes
wshncpdi.txt	225,662 bytes
fipncpdi.txt	264,177 bytes
stncpdi.txt	17,830 bytes
us_f7.txt	19,581,246 bytes
cdbest91.txt	221.061 bytes

Citation:

Coastal Assessment and Data Synthesis (CA&DS) Framework, 1999. National Coastal Assessments (NCA) Branch, Special Projects (SP) Office, National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA). Silver Spring, Maryland.

Contact on Data Processing:

Percy A. Pacheco
Environmental Engineer
NCA Branch, Special Projects (SP) Office, NOS, ORCA
1305 East West Highway, SSMC4, 9th Floor
Silver Spring, Maryland 20910
Tel: 301-713-3000 x 155
Fax:301-713-4384
Email:percy.pacheco@noaa.gov